

# Supplementary Information

for

## High Reversible Li/Li<sub>2</sub>S<sub>3</sub> Batteries with an Advanced Cathode Structure

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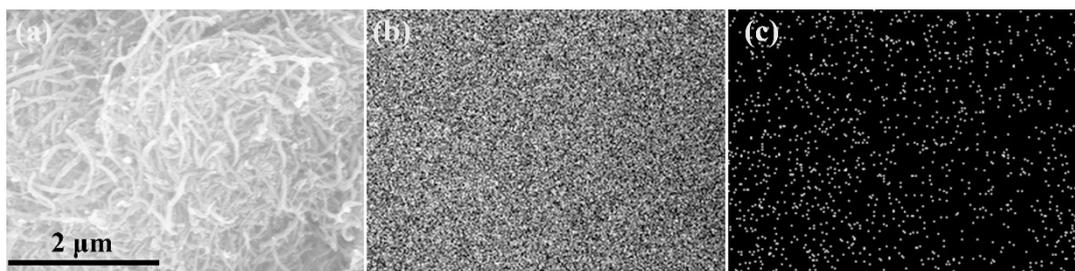


Figure S1. Elementary Mapping for NCNT. (a) SEM image;(b) Mapping for C element; and (c)

Mapping for N element.

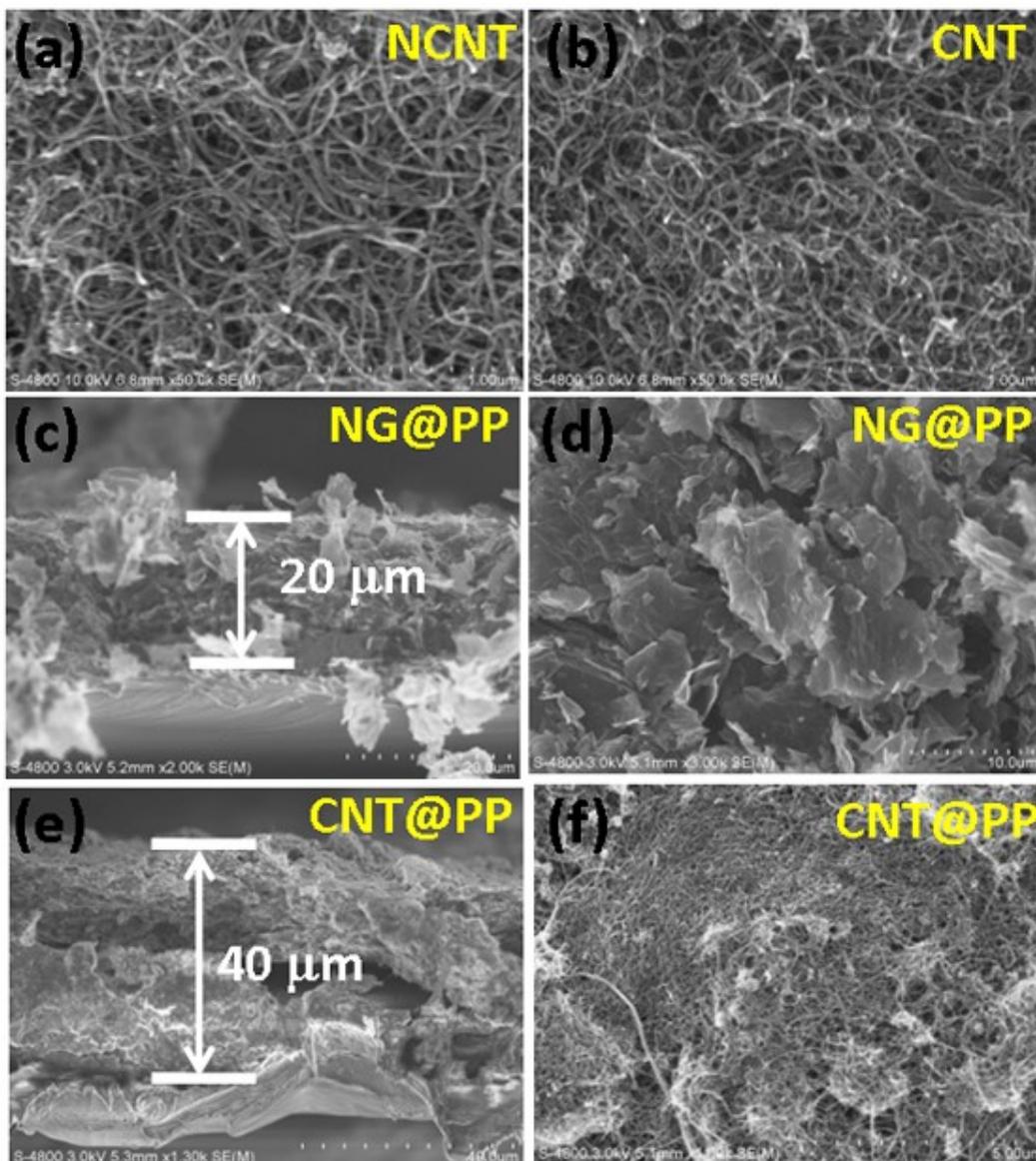


Figure S2. SEM images for various samples. (a) NCNT; (b) pristine CNT; (c) and (d) cross-section and top view of NG coated PP separator, respectively; (e) and (f) cross-section and top view of CNT@PP separator, respectively.

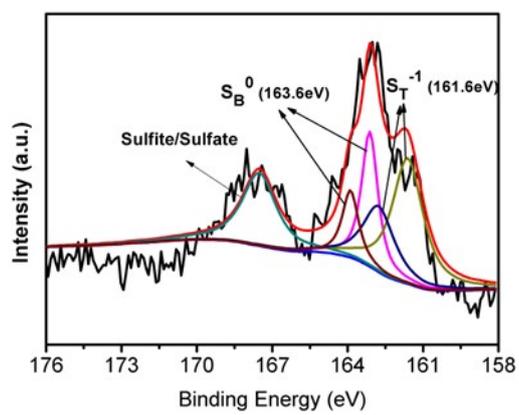


Figure S3. High-resolution XPS S 2p spectra for  $\text{Li}_2\text{S}_3$ .

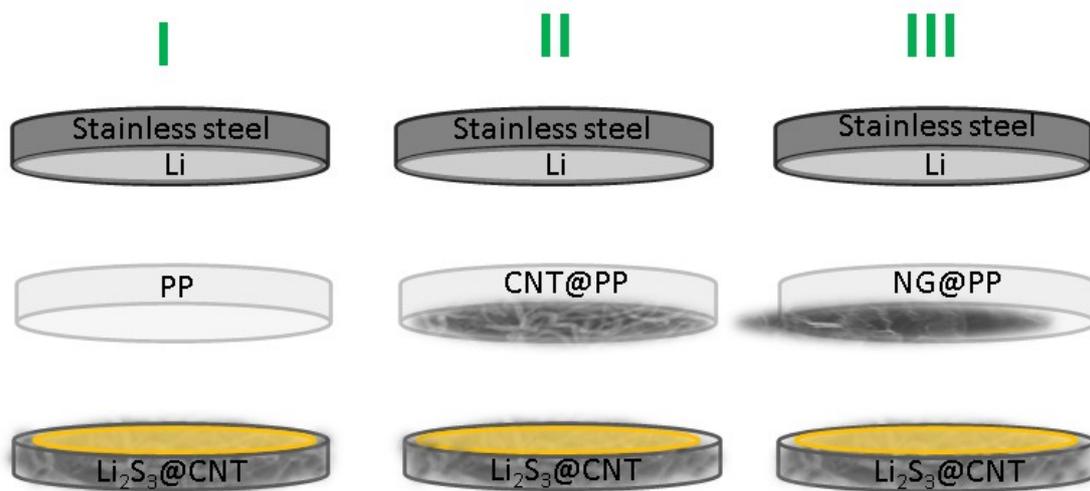


Figure S4. Schematic of battery configurations for comparison: I)  $\text{Li}_2\text{S}_3$ @CNT cathode, commercial PP separator and Li anode; II)  $\text{Li}_2\text{S}_3$ @CNT cathode, CNT@PP separator and Li anode; III)  $\text{Li}_2\text{S}_3$ @CNT cathode, NG@PP separator and Li anode.

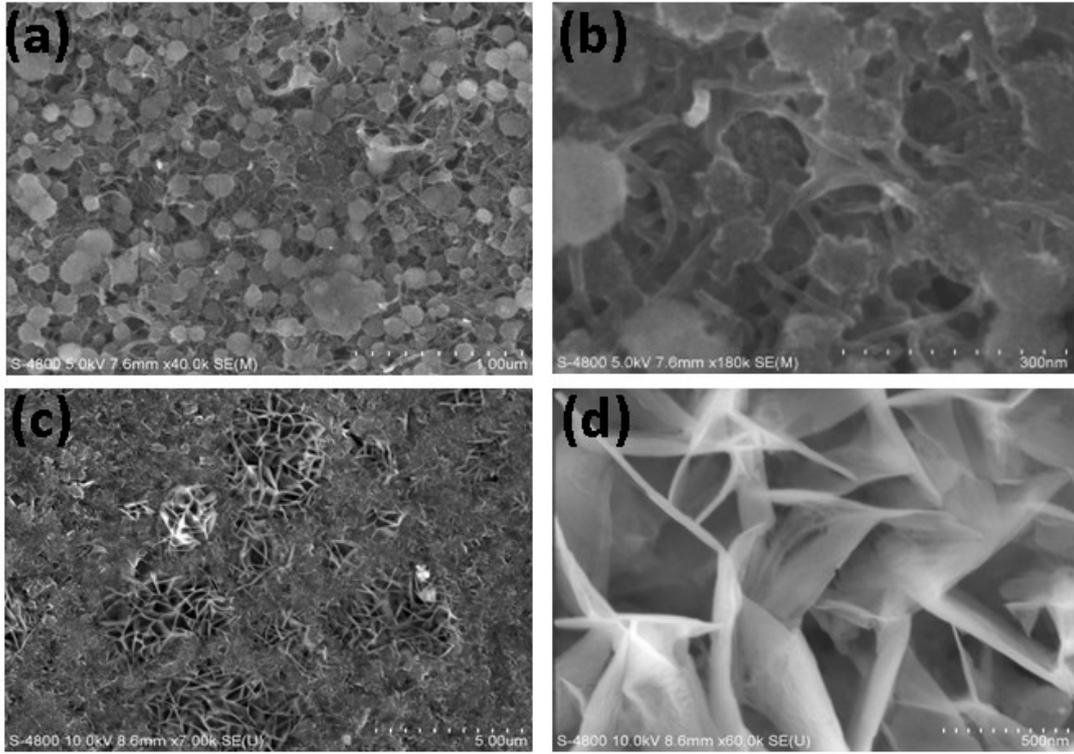


Figure S5. SEM images for cycled NCNT cathode. (a) and (b) for 1<sup>st</sup> cycled cathode and (c) and (d) for 200<sup>th</sup> cycled cathode.

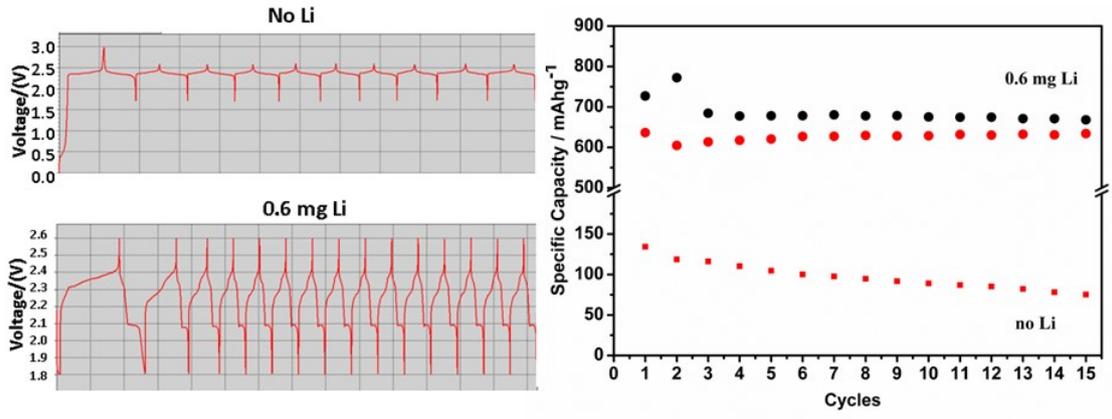


Figure S6. Electrochemical performance for Li-free and minor Li matched  $\text{Li}_2\text{S}_3$  batteries.